

# TASCAM

TEAC Production Products

# 122

MASTER CASSETTE DECK



**OWNER'S MANUAL**

5700012100

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The guarantee of performance that we provide for the 122 must have several restrictions. We say that the recorder will perform properly only if it is adjusted properly and the guarantee is that such adjustment will be possible. However, we cannot guarantee your skill in adjustment or your technical comprehension of the manual. Therefore, calibration is not covered by the Warranty. If your attempts at such things as rebias and record EQ trim are unsuccessful, we must make a service charge to correct your mistakes.

Recording is an art as well as a science. A successful recording is often judged primarily on the quality of sound as art, and we obviously cannot guarantee that. A company that makes paint and brushes for artists cannot say that the paintings made with their products will be well received critically. The art is the province of the artist. TASCAM can make no guarantee that the 122 in itself will assure the quality of the recordings you make.

Your skill as a technician and your abilities as an artist will be significant factors in the results you achieve.

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## INTRODUCING THE TASCAM 122

The TASCAM 122 is a 4-track, 2-channel recorder/reproducer designed for the production environment to produce master cassette tapes. Features are provided to ensure the quality. The tape transport mechanism is two-motor; for stable operation it uses full logic IC control; 3-head construction allows off-the-tape monitoring; Dolby HX is provided to improve high-end response at high levels and a bias and recording level calibration mechanism is provided so that the bias and the reference recording level can be set to their optimum values for each tape used.

The TASCAM 122 has two-speed capability; at double-speed, recording and reproducing have even higher quality. To further improve dynamic range, the optional RX-8 dbx unit can be connected, which will result in a dynamic range of more than 80 dB. To make connection more convenient, LINE IN terminals are provided on the front as well as the rear panel.

For speed in operation, these extra features have been provided: a memory facility which can be used for tape indexing, record muting to eliminate unwanted material, a headphone volume control to adjust the monitoring level and a remote control jack for the connection of the optional RC-90 remote control unit.

To optimize the performance of your TASCAM 122 we request that you read this manual completely before using the machine. Even though a quick glance will get you going, careful study will insure that misunderstandings don't slow you down.

**WARNING: TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.**

This tape deck has a serial number located on the rear panel. Please record the model number and serial number and retain them for your records.

Model number \_\_\_\_\_  
Serial number \_\_\_\_\_

- Noise Reduction System and Headroom Extension System manufactured under license from Dolby Laboratories Licensing Corporation.
- Dolby and double-D symbol are trademarks of Dolby Laboratories Licensing Corporation.
- The Dolby reference point is +3 VU.
- dbx noise reduction system made under license from dbx, Incorporated. The name "dbx" and the dbx symbol are trademarks of dbx, Incorporated.

## Specifications

### MECHANICAL

Tape:	Philips Type Cassette C-60 and C-90
Track Format:	4-Track, 2-Channel Stereo
Tape Speed:	1-7/8 ips and 3-3/4 ips
Speed Accuracy:	1-7/8 ips $\pm 0.5\%$ Deviation 3-3/4 ips $\pm 0.5\%$ Deviation
Wow & Flutter:	1-7/8 ips <sup>1)</sup> $\pm 0.085\%$ peak (DIN/IEC/ANSI weighted) $\pm 0.18\%$ peak (DIN/IEC/ANSI unweighted) 0.06 % (NAB weighted) 0.11 % (NAB unweighted) 3-3/4 ips <sup>2)</sup> $\pm 0.055\%$ peak (DIN/IEC/ANSI weighted) $\pm 0.13\%$ peak (DIN/IEC/ANSI unweighted) 0.04 % (NAB weighted) 0.07 % (NAB unweighted)
Fast Wind Time:	90 secs. for MTT-501 (C-60)
Motor:	1 FG Servo Controlled DC Motor 1 DC Reel Motor
Head Configuration:	3 Heads; Erase, Playback/Record
Dimensions (WxHxD):	19" x 5-13/16" x 13-9/16" (482 x 147 x 345 mm)
Weight:	19-13/16 lbs. (9 kg) net

### ELECTRICAL

Line Input 1, 2:	
Input Impedance:	50k ohms unbalanced
Maximum Source Impedance:	10k ohms or less
Nominal Input Level:	-14 dBV (190 mV)
Minimum Input Level:	-24 dBV (60 mV)
Line Output:	
Minimum Load Impedance:	25k ohms or more, unbalanced
Output Impedance:	3.5k ohms or less
Nominal Output Level:	-10 dBV (0.3 V)
Maximum Output Level:	-7.5 dBV (0.42 V)
Headphone Output:	100 mW Maximum at 8 ohms
Bias Frequency:	100 kHz
Equalization:	1-7/8 ips 3180 $\mu$ s. + 70 $\mu$ s. 3180 $\mu$ s. + 120 $\mu$ s. switchable 3-3/4 ips 3180 $\mu$ s. + 35 $\mu$ s. 3180 $\mu$ s. + 50 $\mu$ s. switchable
Frequency Response <sup>3)</sup> (Record/reproduce):	1-7/8 ips 35 Hz - 14 kHz $\pm 3$ dB at -20 VU 35 Hz - 6.3 kHz $\pm 3$ dB at 0 VU 3-3/4 ips 35 Hz - 20 kHz $\pm 3$ dB at -20 VU 35 Hz - 15 kHz $\pm 3$ dB at 0 VU
Total Harmonic Distortion (THD) <sup>3)</sup> :	1 % at 0 VU, 1 kHz, 160 nWb/m 1-7/8 ips 3 % at 9 dB above 0 VU, 1 kHz, 451 nWb/m 3-3/4 ips 3 % at 10 dB above 0 VU, 1 kHz, 506 nWb/m
Signal to Noise Ratio <sup>3)</sup> :	At a reference of 3 % distortion level 1-7/8 ips 58 dB weighted 55 dB unweighted 92 dB weighted with DBX 3-3/4 ips 63 dB weighted 58 dB unweighted 92 dB weighted with DBX
Adjacent Channel Separation:	Better than 35 dB at 1 kHz
Erase:	Better than 65 dB at 1 kHz + 10 VU reference
Headroom:	
Recording amplifier:	Better than 19 dB above 0 VU
Reproduce amplifier:	Better than 19 dB above 0 VU
Power Requirement:	120 V AC, 60 Hz, 41 watts

In these specs. 0 dBV is referenced to 1 V

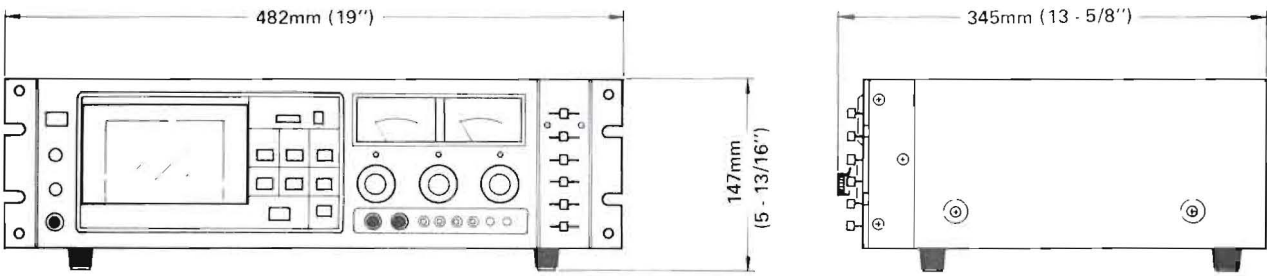
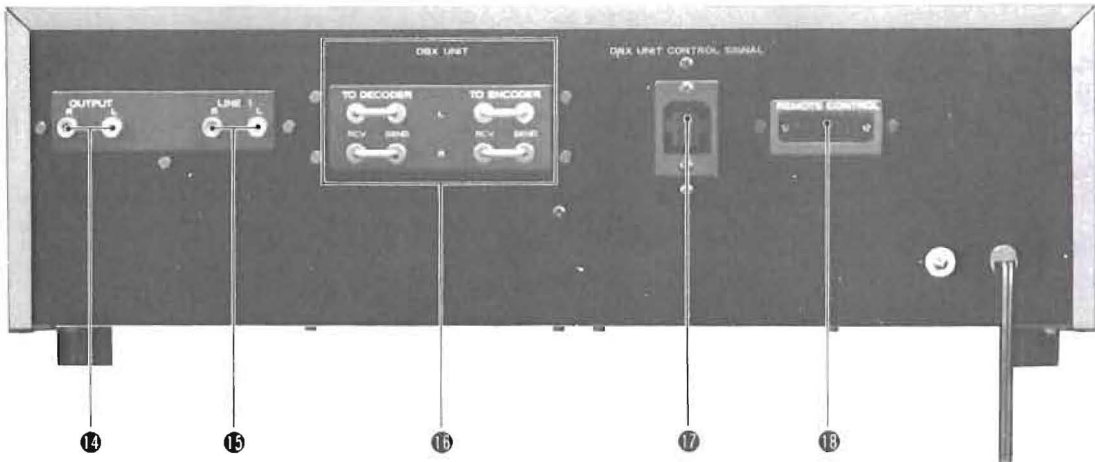
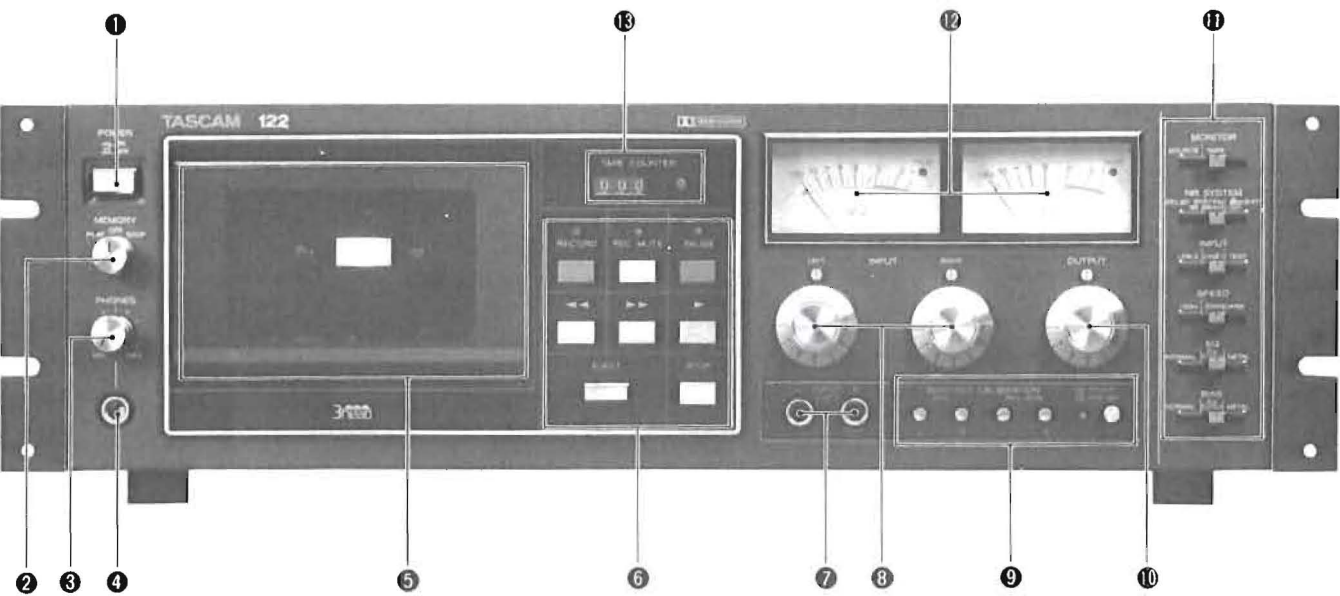
1) Specifications were determined using TEAC Test Tape MTT-111

2) Specifications were determined using TEAC Test Tape MTX-111

3) Specifications were determined using TEAC Test Tape MTT-506



Features and Controls



### ❶ POWER switch

This controls the supply of AC line power to the deck. Pressing it switches the deck on; lamps in the VU meters and cassette holder will light. Press and release to switch off the power; the lamps will then go out.

### ❷ MEMORY switch

This works in conjunction with the TAPE COUNTER and rewind function to rewind to any required part of the tape. Reset the TAPE COUNTER to 000 by pressing the reset button at that point to which you want to return. If the MEMORY switch is in the STOP position, when the rewind (◀◀) button is pressed, the tape will be rewound until the counter has counted down to 999 (just beyond 000) and the tape will stop automatically. If the MEMORY switch is in the PLAY position, when the counter has counted down to 999, the tape will stop and then be played back automatically.

**Note:**

To hear tape playback, the MONITOR switch must be in the TAPE position. Set the MEMORY switch to OFF when these functions are not required.

### ❸ PHONES control

This is used to adjust the output volume for the headphones.

### ❹ PHONES jack

Connect 8-ohm stereo headphones to this jack to monitor recordings or to listen to a tape directly without the use of an amplifier.

### ❺ Cassette holder

The door of the cassette holder is opened by pressing the EJECT button. Cassettes should be inserted with the exposed tape downwards and the side you want to hear or record on facing towards you. The face plate of this door can be removed for easy access to the heads for cleaning, etc. (See page 22.)

### ❻ Transport controls

#### ▶(Play) button

Pressing this button causes the tape to run from left to right. If it is pressed in the record muting or record/pause mode, normal reading is resumed.



#### ◀◀(Rewind) button

Press this button to rewind the tape at high speed to the beginning of tape or to the point where the tape counter reads 999 if the MEMORY function is used. The end-stop mechanism stops the tape transport and automatically releases all functions when the tape reaches the end.

#### ▶▶(Fast Forward) button

Press this button to fast forward the tape. The end-stop mechanism automatically stops the transport when the tape reaches the end.

#### STOP button

Press this button to stop the tape and release the current operating mode.

#### EJECT button

The EJECT button cannot be pressed until the STOP button has been pressed.

#### RECORD button

To start recording, press this button and, while holding it in, press the play (▶) button. The deck will then enter the record mode, the RECORD indicator will light and the tape will run. If the RECORD and PAUSE buttons are pressed simultaneously, the deck will enter the record/pause mode — the deck is now ready for recording but the tape will not run. To start recording from the record/pause mode, simply press the play (▶) button. In the record/pause mode, both the RECORD and PAUSE indicators will light.

**Note:**

It is not possible to enter the record mode if the record protection tabs on the spine of the cassette have been removed. (See page 13.)

#### REC MUTE (Record Muting) button

If the REC MUTE button is pressed while a recording is being made, the audio signals are interrupted and only the erase signal is applied to the tape so that no audio signal will be recorded on the tape.

To release the record muting mode, press either the play (▶) or PAUSE button. For a fuller explanation of record muting, see page 14.

#### PAUSE button

Press to stop the tape temporarily in the record, record muting or play mode. The pinch roller retracts from the capstan and the tape stops moving but the previously selected mode is retained. Press the (◀◀), (▶▶), (▶) or STOP button to release the pause mode.

**Note:**

**PAUSE will not operate in the rewind and fast forward modes.**

#### ⑦ INPUT LINE 2 jacks

This pair of RCA jacks is provided as a convenience, and duplicates the function of the rear (line 1) input jacks for connecting a receiver or other line level source to your 122.

#### ⑧ INPUT (LEFT, RIGHT) controls

These controls are used to adjust the levels of the left and right input signals so that they have suitable level to be recorded on the tape. The left and right controls are geared together to allow simultaneous adjustment of both channels. To adjust one channel independently of the other (to alter the channel balance), hold one knob while turning the other.

#### ⑨ BIAS/REC CALIBRATION trimmers and button switch

With the button in the PRE-SET (out) position, the bias levels suitable for recording on normal, cobalt (Co), chromium dioxide (CrO<sub>2</sub>) and metal tape can be selected using the BIAS switch, while the reference recording level is adjusted to match the average sensitivity for each type of tape. These factory-preset levels are average values for the three types of tape. For precise calibration of the bias and recording levels to exactly match the tape you are using, set the button to the ADJUST (in) position and adjust the trimmers using a screwdriver. This procedure is explained in detail on pages 15 – 16.



#### ⑩ OUTPUT control

This knob is used to adjust the level of the signals delivered from the OUTPUT jacks on the rear panel. Both channels are adjusted together. The readings of the VU meters are not affected by this control.

#### ⑪ Function switches

##### MONITOR switch

This switch selects the signals fed to the headphones (PHONES) jack and the OUTPUT jacks and indicated by the VU meters.

**SOURCE:** Selects the input connected to the LINE 1 (rear) LINE 2 (front) jacks. The levels displayed by the VU meters depend on the setting of the INPUT controls.

**TAPE:** Selects the signal from the tape. The levels displayed by the VU meters are the levels of the signals recorded on the tape; they are not affected by the setting of the OUTPUT control.

**Note:**

**For tape playback the MONITOR switch must be in the TAPE position.**

##### NR SYSTEM switch

**DOLBY SYSTEM/NR:** Selects the built-in Dolby Noise Reduction circuit; use this position to make a Dolbyized recording or to reproduce a Dolby-encoded cassette.

**DOLBY SYSTEM/NR + HX:** Selects the Dolby Noise Reduction circuit and also the Dolby Headroom Extension (HX) circuit which gives greater headroom in recording. Tapes recorded with the switch in this position can be played back with the switch in the same position or in the DOLBY SYSTEM/NR position.

**dbx (EXT)/ OUT:** Use this position to record or reproduce without noise reduction or when NOISE REDUCTION IS DONE USING THE OPTIONAL RX-8 DBX NOISE REDUCTION UNIT.

##### INPUT switch

This switch selects the signals fed to the recording circuit for recording.

**LINE 1:** Selects the signals applied to the rear panel LINE 1 jacks.

**LINE 2:** Selects the signals applied to the front panel LINE 2 jacks.

**TEST:** Use this position when setting the bias and recording level calibration controls using a separate signal generator. This is described on pages 15 – 16.



### **SPEED switch**

**HIGH:** Selects a tape speed of 3-3/4 ips for maximum fidelity when you want the ultimate performance from the deck. The tape travels at twice the normal speed, so you get only half the normal recording time.

**STANDARD:** This selects the normal cassette tape speed of 1-7/8 ips.

### **EQ switch**

This selects the equalization characteristics of the 122 to match the type of tape being used in order to improve the frequency response and signal-to-noise ratio and to reduce distortion.

**NORMAL:** The equalization will be suitable for ordinary cassette tape. Labeled 120  $\mu$ s.

**Co (CrO<sub>2</sub>):** The equalization will match cobalt or chromium dioxide tape. Labeled 70  $\mu$ s.

**METAL:** The equalization will match high-performance metal tape. Labeled metal Eq.

### **Note:**

The EQ switch should be set to match the tape for both recording and playback.

### **BIAS switch**

This selects the factory-preset bias levels to match the type of tape being used for recording (with the BIAS/REC CALIBRATION button in the PRE-SET position).

**NORMAL:** The bias will be suitable for ordinary cassette tape. Labeled normal bias.

**Co (CrO<sub>2</sub>):** The bias will be suitable for cobalt or chromium dioxide tape. Labeled high bias.

**METAL:** The bias will match high-performance metal tape.

### **Note:**

The bias has no effect during playback; it must be set correctly in recording to get optimum performance from the tape you are using.

### **⑫ VU meters**

With the MONITOR switch at SOURCE, these meters indicate the record signal level going to tape, with the 122 in the record or record/pause mode. With the MONITOR switch at TAPE, they indicate the levels of the signals recorded on the tape. A PEAK LED is provided in each meter; this lights to warn you of overload at +8 dB input level which could result in distorted recording.

### **⑬ TAPE COUNTER**

This counts up when the tape is moving forward and counts down when the tape is moving in reverse. It can be reset to 000 by pressing the RESET button to the right of the counter. It is used together with the MEMORY switch for auto stop and auto replay operations. For an explanation of this, see MEMORY switch ②.

### **REAR PANEL CONNECTIONS**

#### **⑭ OUTPUT (R, L) jacks**

Use these OUTPUT terminals to feed the signals from the 122 to your mixer, receiver, pre-amplifier, etc..

#### **⑮ LINE 1 (R, L) jacks**

The signals from other equipment (your pre-amplifier, receiver, audio mixer, etc.) enter the 122 through these terminals.

#### **⑯ DBX UNIT terminals**

These eight RCA pin-terminals are used for the connection of the optional RX-8 dbx noise reduction unit; follow the instructions given in the RX-8 Owner's Manual. If the RX-8 is not used the shorting links provided must be left in place.

### **WARNING:**

When the RX-8 is not used the U links must be installed or the 122 will not operate.



#### **⑰ DBX UNIT CONTROL SIGNAL socket**

This is a special socket which feeds the control signal to the optional RX-8 dbx noise reduction unit.

#### **⑱ REMOTE CONTROL socket**

Connect the optional TEAC RC-90 Remote Control unit for full remote control of operation from about 15 feet away.

#### **Connection of the remote control unit**

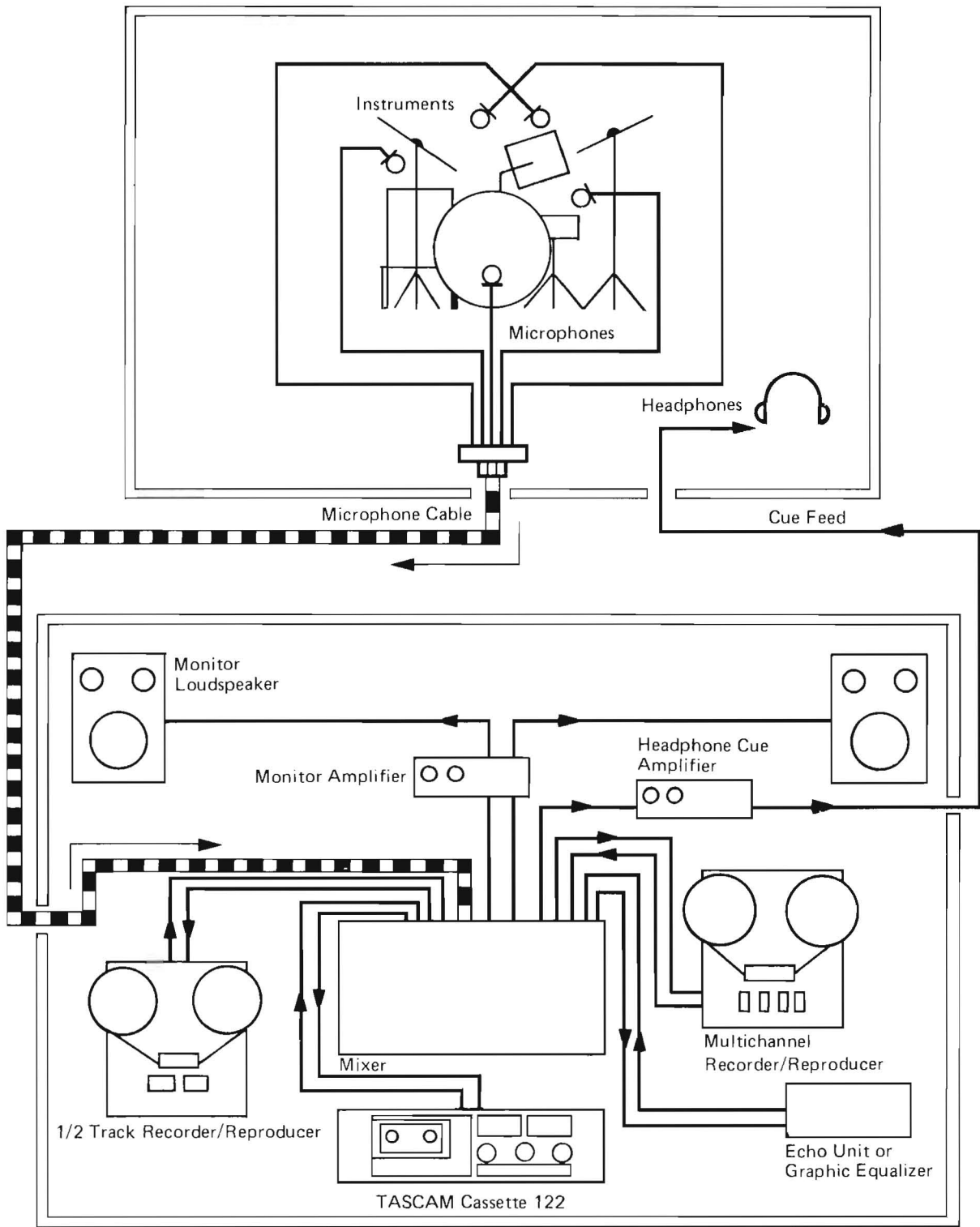
Connect the optional RC-90 Remote Control Unit to the rear panel REMOTE CONTROL socket, being careful that the pins are aligned correctly.



# Connection

Before making connections, read the manuals of the other components to be connected. ALL CONNECTIONS SHOULD BE MADE WITH POWER TO THE AMPLIFIER AND OTHER

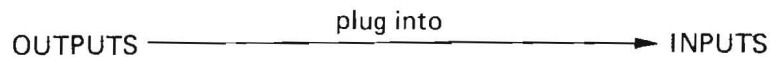
COMPONENTS SWITCHED OFF OR DAMAGE TO SPEAKERS AND OTHER SYSTEM COMPONENTS MAY OCCUR.



## Impedance Matching and Line Levels

All electronic parts, including cables and non-powered devices (mics, passive mixers and such), have impedance, measurable in ohms (symbol  $\Omega$  or Z). Impedance is the total opposition a part presents to the flow of signal, and it's important to understand some things about this value when

you are making connections in your mixing system. The outputs of circuits have an impedance rating and so do inputs. What's good? What values are best? It depends on the direction of signal flow, and in theory, it looks like this:



It is generally said that the output impedance (Z) should be as low as possible. 100 ohms, 10 ohms, the lower, the better, in theory. A circuit with a low output impedance will offer a low resistance to the passage of signal, and thus will be able to supply many multiple connections without a loss in performance or a voltage drop in any part of the total signal pathway. Low impedance values can be achieved economically by using transistors and integrated circuits, but other considerations are still a problem in practice.

1. The practical power supply is not infinitely large. At some point, even if the circuit is capable of supplying more energy you will run out of "juice".
2. Long before this happens, you may burn out other parts of the circuit. The output impedance may be close to the theoretically ideal "ohms" but many parts in the practical circuit are not. Passing energy through a resistance generates heat and too much current will literally burn parts right off the circuit board.
3. Even if the circuit does not destroy itself, too high a demand for current may seriously affect the quality of the audio. Distortion will rise, frequency response will suffer, and you will get poor results.

The classic measurement for Output impedance is to load a circuit until the voltage drops 6 dB (to half the original power) and note what the load value is. In theory, you now have a load impedance that is the same as the output impedance. If you reduce the load gradually, the dB reading will return slowly to its original value. How much drop is acceptable? What load will be left when an acceptable drop is read on the meter?

When the load value (input Z) is approximately seven times the output impedance, the needle is still a little more than 1 dB lower than the original reading.

Inputs should have very high impedance numbers, as high as possible 100,000 ohms (1 million ohms, more, if it can be arranged). A high resistance to the flow of signal at first sounds bad, but you are not going to build the gear. If the designer tells you his input will work properly and has no need for a large amount of signal, you can assume that he means what he says. For you, a high input impedance is an unalloyed virtue. It means that the circuit will do its job with a minimum of electrical energy at a beginning. The most "economical" electronic devices in use today, have input impedances of many millions of ohms. Test gear. For example, voltmeters of good quality must not draw signal away from what they are measuring or they will disturb the proper operation of the circuit. A design engineer needs to see what is going on in his design without destroying it, so he must have an "efficient" device to measure with.

Most technicians say "1 dB, not bad, that's acceptable". We at TEAC must say we do not agree. We think that a seven-to-one ratio of input (7) to output (1) is not a high enough ratio, and here's why.

1. The measurement is usually made at a mid-range frequency and does not show true loss at the frequency extremes. What about drop at 20 Hz?
2. All outputs are not measured at the same time. Most people don't have twenty meters, we do. Remember, everybody plays together when you record and the circuit demands, in practice, are simultaneous. All draw power at the same time.

Because of the widely misunderstood rule of thumb, the seven-to-one ratio, we will give you the values for outputs in a complete form. Even though the true output impedance may be low, say 100 Ohms, for the practical reasons explained previously, we feel that 7:1 ratio is not sufficient. To use this rule of thumb, you must use a higher value. We'll call this value the "output load impedance". For example, in our model 2A mixer:

Cue Out 1.4K Ohms  
Acc Send 1.4K Ohms  
Line Out 1.4K Ohms

This is a number that will give good results with the 7:1 method. To go one step further, here are the actual minimum ohmic values we feel are wise. Connect no TOTAL INPUT IMPEDANCE LOAD higher than:

Cue Out 10K Ohms  
Acc Send 5K Ohms  
Line Out/Aux Out 5K Ohms

Input impedance is more straightforward and requires only one number. Load is load, and here are the values for the 2A:

Mic In 50K Ohms  
Mic Att 50K Ohms  
Line In 20K Ohms  
Acc Receive 15K Ohms  
Buss In 15K Ohms  
Cue Out when used as Input 10K Ohms

If one output is to be "Y" connected to two inputs, the total impedance of the two inputs must not exceed the load impedance, as mentioned before, and if it becomes necessary to increase the number of inputs with slight exceeding of the load spec., you must check for drop in level, loss of headroom, low frequency response, or else suffer from a bad recording. If one input is 10,000 ohms, another of the same 10,000 ohms will give you a total input impedance (load) of 5,000 ohms. To avoid calculations you can do the following when you have two inputs to connect to one output. Take the lower value of the two input impedances and divide it in half. If the number you have is still 7x the output impedance, you can connect both at the same time. Remember, we are not using the true output impedance, we are using the adjusted number in group 1, output load impedance.

When you have more than two loads (inputs), just dividing the lowest impedance by the number of inputs will not be accurate unless they are all the same size. But if you still get a safe load (higher than 7:1 ratio) by this method, you can connect without worry. If you must have exact values, here are the formulae: For more than 2:

$$R_x = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots + \frac{1}{R_n}}$$

Rx = Value of Total Load

For 2 loads or inputs:

$$R_x = \frac{R_1 \times R_2}{R_1 + R_2}$$

### Finding Impedance Values on Other Brands of Equipment

When you are reading an output impedance specification, you will occasionally see this kind of statement:

Minimum load impedance = X ohms  
or

Maximum load impedance = X ohms

These two statements are trying to say the same thing, and can be very confusing. The minimum load impedance says: please don't make the NUMBER of ohms you connect to this output any lower than X ohms. That's the lowest NUMBER. The second statement changes the logic, but says the exact same thing.

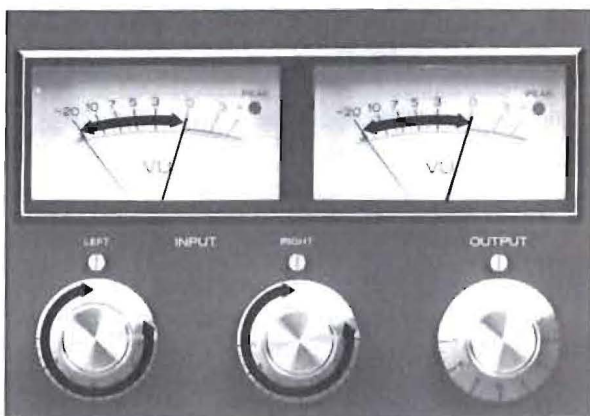
Maximum load impedance refers to the idea of the LOAD instead of the number, and says: please don't make the LOAD any heavier. How do you increase the load? Make the number lower for ohms. Maximum load-minimum ohms, so read carefully.

When the minimum/maximum statement is made, you can safely assume that the manufacturer has already done the "seven times is best" ratio calculation. And the number given in ohms does not have to be multiplied. You can MATCH the ohmic value of your input to this number of ohms successfully, but as always, higher ohms will be okay (less load).

Occasionally, a manufacturer will want to show you that 7x the output ohms is not quite the right idea and will give the output impedance and the correct load this way. They will call the output impedance the true impedance and then will give the recommended lowest LOAD impedance, it may be a higher or lower ratio than 7x — and will be whatever the specific circuit in question requires.



### SETTING THE RECORDING LEVEL



The recording level is adjusted by turning the INPUT controls with the MONITOR switch set to SOURCE. Observe the VU meters and turn the controls so that the loudest peaks register about 0 VU + 3 dB without the PEAK LEDs lighting. The basic guideline is that the deflection of the needles should be maximum without the peak warning LEDs lighting.

If you're really serious about making consistent high quality recordings, then a reliable tone oscillator is necessary so that you can accurately calibrate your system. We recommend the TEAC TO-122A and TO-8 test-tone oscillators. See the sections "Bias and Recording Level Calibration" and "Systems Calibration" on pages 15 – 18 and read together with the oscillator's instruction manual.

Level adjustment is slightly different when you are making dbx recordings with the RX-8 noise reduction unit connected. Here, the reference level is 0 VU as with ordinary recordings, however, it is advisable to set the recording 3 dB lower than usual with the RX-8 so that even the loudest peaks do not exceed 0 VU.

### STEREO RECORDING

- ① Select the required tape speed (HIGH or STANDARD).
- ② Set the BIAS and EQ switches according to the tape being used. Make sure the BIAS/REC CALIBRATION button is in the PRE-SET position (out) unless you have used the calibration facility.
- ③ Set the NR SYSTEM switch to the desired position.
- ④ Set the MONITOR switch to SOURCE.
- ⑤ Press the RECORD and PAUSE buttons. The deck will now enter the record/pause mode and the RECORD and PAUSE indicators will light. This will enable you to adjust the recording level before you start recording.
- ⑥ With the Audio Signal source connected to the rear panel LINE 1 or front panel INPUT LINE 2 jacks, adjust the recording level using the INPUT controls.  
Starting from the fully counterclockwise position, gradually turn the INPUT controls until peaks in the source sound make the meter needle deflection maximum without the PEAK indicators lighting. (See this page, "Setting the Recording Level".)
- ⑦ When everything is set and ready to go, press the play (▶) button to start recording.
- ⑧ To stop recording, press the STOP button. To stop temporarily, press the PAUSE button. In this case, the record mode is retained and recording can be restarted by pressing the play button.

#### • Monitoring off the tape

To find out what the signals being recorded on the tape actually sound like, set the MONITOR switch to TAPE. You can now hear the actual signals coming off the tape. By changing the MONITOR switch from SOURCE to TAPE, you can compare the sound of the original source with that recorded on the tape.

#### • Monitoring with headphones

By plugging stereo headphones into the PHONES jack you can monitor the recording. Both source monitoring and off-the-tape monitoring are possible. The volume of headphone sound can be adjusted using the control immediately above the jack without affecting the recording level.



## STEREO REPRODUCING

1. Set the SPEED switch to the tape speed used in recording.
2. Set the EQ switch to the position used in recording.
3. Set the NR SYSTEM switch to the position used in recording.
4. Press the play ( ▶ ) button to start tape playback.
5. When you want to stop the tape, press the STOP button.

- **OUTPUT level**

Stated at its simplest, a good working position of the OUTPUT control is "8". From this position, careful monitoring and experimentation will help you determine the optimum setting.

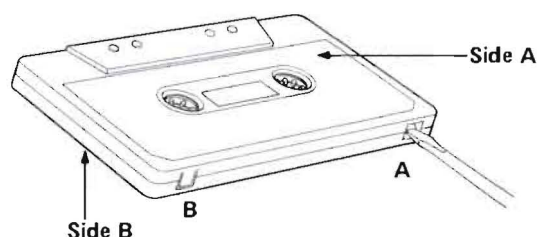
- **Reproducing through headphones**

Once the output level control is set to a good working or system calibration position, the PHONES control should be used to adjust the volume of the headphones.

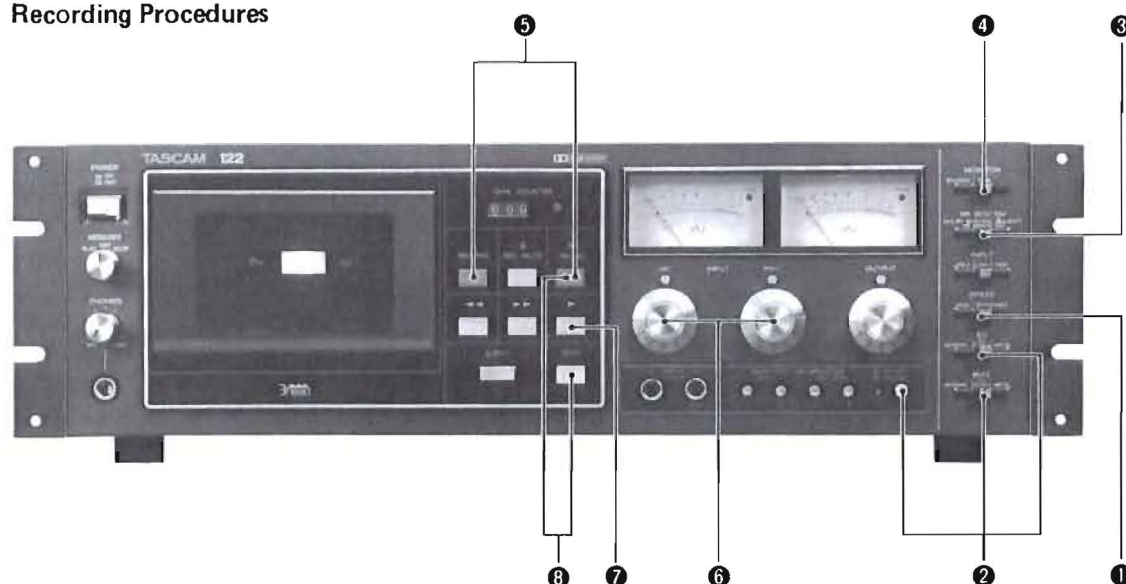
## Protecting Tapes Against Accidental Erasure

Cassettes have tabs on the spine and by breaking off these tabs (with a screwdriver or similar tool) you can protect your tapes against accidental erasure. With the cassette positioned as shown in the diagram, tab A protects side A and tab B protects side B. When the tab has been broken off, that side of the tape cannot be used for recording.

When you load a cassette for recording, **check** that the tab is in place. After making a recording, if you are satisfied and want to protect the recording, break off the corresponding tab. If you want to reuse a cassette after the tab has been broken off, seal the hole with Scotch Tape or its equivalent.



## Recording Procedures



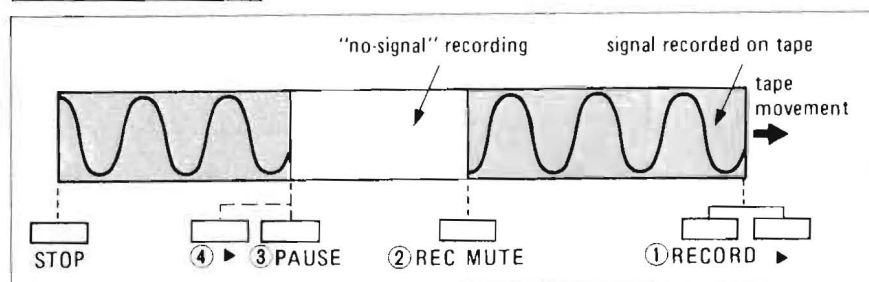
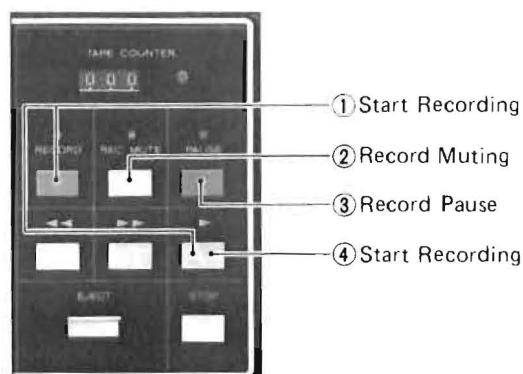
## RECORD MUTING

The ability to leave unrecorded (erased) portions on a tape is a great advantage in many recording situations. You may want a period of silence between songs. These erased portions of tape could, of course, be created using a deck without the record muting capability of the 122, but the operation would be cumbersome and require several extra steps, which increases the chances of making an error. The system used in the 122 makes the operation smooth and simple. During recording, when you want the erased space to begin, just press the REC MUTE button. The tape movement continues and the tape is erased until the PAUSE button is pressed, which stops the tape and puts the deck in the record/pause mode. To start recording the next selection, all you have to do is press the play button. You can also go from the record muting mode to the record mode by pressing the play button instead of the PAUSE button. WHEN USING THIS FACILITY, SET THE MONITOR SWITCH TO SOURCE, OTHERWISE, WHEN YOU ENTER THE RECORD MUTING MODE YOU WON'T HEAR WHEN TO START RECORDING AGAIN.

The RECORD, REC MUTE and PAUSE indicators light to indicate the operation mode.

### Note:

You can go directly from the record/pause mode to the record muting mode by holding mute button and pressing "PLAY"; deck enters "REC-MUTE".



## ERASING

When a new recording is made on a tape, the previous recording is automatically erased; you don't have to erase first before making a recording on a tape which has already been used. However, it is possible to erase recordings without making a new recording. To do this, depress RECORD and PAUSE simultaneously, then holding the MUTE button down press PLAY. The tape will play then in the record mute mode and erase the tape. After erasing one side of the cassette, to erase the other side, turn it over and repeat the procedure. TO ERASE LARGE VOLUMES OF TAPE QUICKLY, WE RECOMMEND THE USE OF THE TEAC E-2A BULK ERASER. This can be used to erase all types of tape except metal tape.



## To Make Professional Quality Recordings

### BIAS AND RECORDING LEVEL CALIBRATION

Tapes differ considerably in the bias required to record on them and in their sensitivity. Different types of tape are available — normal (ferric), chrome, cobalt, ferrichrome, metal. Within each type there are differences between tapes from different manufacturers; even the same type of tape from the same manufacturer can differ between production lots. Because of these fairly wide differences, setting the BIAS switch so as to obtain a factory-preset value of bias and using the standard reference recording level may not result in recordings of a consistent quality. The TASCAM 122 allows fine adjustment of bias to exactly match the tape being used; also the reference recording level can be precisely adjusted to compensate for differences in sensitivity so that a flatter recording/playback frequency response can be obtained. By adjusting (calibrating) to obtain precisely the correct levels for every tape, performance is optimized.

- Before starting adjustment, be sure to clean the heads, tape guides, rollers, etc. and demagnetize the heads and all metal parts in the tape path using the TEAC Recorder maintenance kit and E-3 Head Demagnetizer.
- You will need a test-tone oscillator such as the TEAC TO-8 or equivalent.
- If you make adjustment while monitoring through speakers, turn down the volume of the amplifier to avoid possible damage to the speakers.
- Bias can be calibrated for only one type of tape (corresponding to one setting of the BIAS switch) at a time. When the calibration switch is set to ADJUST (in), the last calibration is effective. Whenever you calibrate bias, note which type of tape it corresponds to for easy reference.

#### Preparation

- Connect the test-tone oscillator to the LINE 1 jacks of the 122 and load a cassette for recording.
- The controls and switches of the 122 should be set as follows:  
POWER ..... ON  
INPUT ..... LEFT and RIGHT both "0"  
OUTPUT ..... Position "8"  
MONITOR .... SOURCE  
NR SYSTEM .. OUT

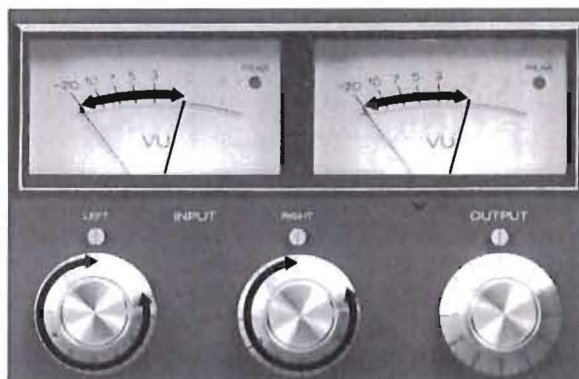
#### Note:

If RX-8 is being used, disconnect RX-8 and reinstall U links to perform calibration procedure.

INPUT ..... TEST  
SPEED ..... STANDARD  
MEMORY .... OFF  
EQ ..... Relevant tape  
BIAS ..... Relevant tape  
BIAS/REC  
CALIBRATION .... ADJUST

#### Adjustment sequence

1. Put the deck in the record/pause mode by pressing the PAUSE and RECORD buttons.
2. Set the test-tone oscillator to 6.3 kHz/-30 dB.
3. Set the INPUT level controls so that the VU meters read 0 VU.



4. Start recording by pressing the play button.
5. Shift the MONITOR switch to TAPE.
6. Turn the BIAS trimmers fully counterclockwise.



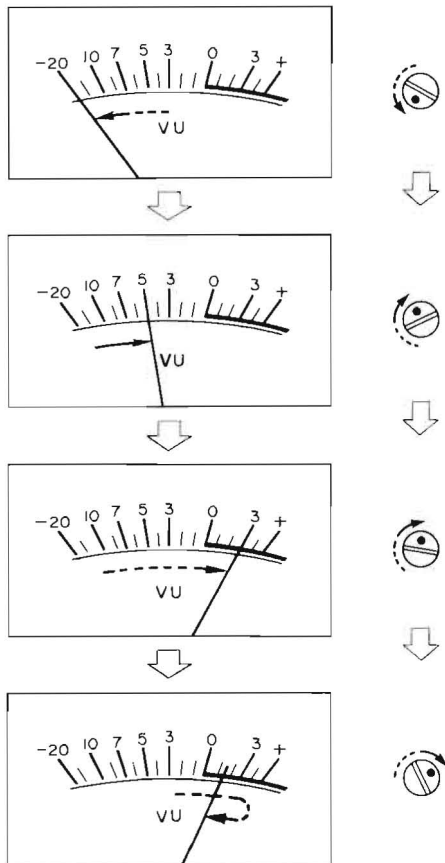
7. Slowly turn the BIAS trimmers clockwise; first one, then the other.



8. When you turn the BIAS trimmers, the deflection of the VU meter needles will first increase, then, as the trimmers are turned further clockwise, the deflection will decrease. Continue the clockwise rotation of the trimmers slowly until the reading on the meter drops back 1.5 VU\* from the peak (that is; the level, lowered 1.5 VU from the peak, should be the BIAS SETTING POINT.)

\*0.5 VU when metal tape is used.

#### Bias Level Adjustment Sequences



9. Switch the oscillator to 400 Hz/-30 dB.  
10. Turn the REC LEVEL trimmers so that the VU meters read 0 VU.

11. While recording, alternate the oscillator signal between 12.5 kHz/-30 dB and 400 Hz/-30 dB and fine-adjust the BIAS trimmers by rotating clockwise so that the VU meters give the same readings\* for both frequencies.

\*This is to suit the level at 12.5 kHz with that at 400 Hz to obtain normal frequency response in the high frequency range. Optional settings depend on the tape's high-end frequency response.

12. Set the oscillator signal back to 400 Hz/-30 dB and fine-adjust the REC LEVEL trimmers so that the VU meters read 0 VU.





## SYSTEMS CALIBRATION

### Note:

Peak meters may vary considerably in the values which are equivalent to 0 VU. If any of the equipment in your system uses peak meters, make sure you match your peak meter levels to correspond to 0 VU; do not automatically assume a direct correlation between the readings on the two different types of meters.

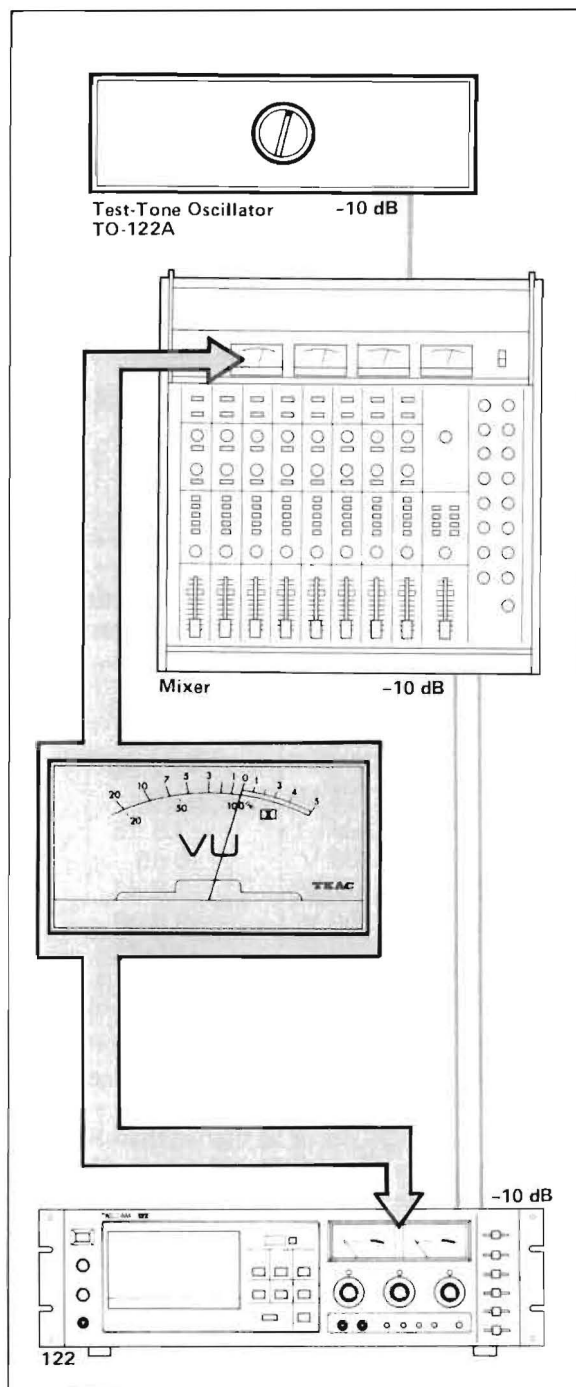
### Calibrating

"Calibration" simply means matching all the reference levels in your recording system to ensure that signals from one element in the system are equally interpreted by all the other elements in the system.

If you're really serious about making true professional-quality recordings, then a reliable tone generator is a necessity in order to accurately calibrate your system. We recommend the TEAC TO-122A test-tone oscillator. When using a tone generator, select a signal that will be equivalent to 0 VU when passed through the device to which you are calibrating the 122. For example, if you are using a mixer with 0 dB referenced to 1 V (TASCAM mixers and recorders all use this reference level) and the mic input level is -60 dB and the line level (both input and output) is -10 dB, then, with the mixer's faders set to the shaded area, a 1 mV signal fed through the mic input or a 316 mV signal fed through the line input can be used to precisely establish the 0 VU level on the mixer. In this case (as with TASCAM line), -10 dB corresponds to 0 VU. If the equipment you are using references 0 dB to .775 V rather than 1 V, then a correction factor of -2.2 dB will have to be used to compensate for the difference.

The frequency of the tone used as the calibration signal has little affect on calibration, so any reasonable frequency may be used (400 Hz or 1 kHz is recommended). If you wish to calibrate your system without a tone generator, any source that produces a sustained tone, such as a musical instrument or even a vacuum cleaner, can be used to generate a reference signal; however, since there is no way to measure the reference level of such a signal, experimentation with microphone placement and/or different volumes will be required to establish a reasonable recording reference level.

To calibrate, use a sustained tone and set the controls on your mixer and/or multitrack recorder so that their VU meters read 0 VU, and, passing the signal through the multitrack recorder and/or mixer, set the controls on the



122 so that its VU meters also read 0 VU. After calibrating your system, make all subsequent level adjustments from the mixer or the first unit receiving input in the recording chain; do not change the controls on the rest of your equipment.

When using an oscillator for system calibration, start with a frequency setting somewhere mid-point in the audio range. This will ensure that frequency limitations of metering circuitry will not affect accuracy. The audio range is three decades wide so choose a frequency typically in the 200 to 2000 Hz area of the audio range. All TASCAM mixers and recorders use the IEC standard, 1 Volt = 0 dB or 0 dBV, as the reference to which all measurements are made. The input level (and output level) that TASCAM gear uses as its 0 VU reference, is -10 dBV, or 0.316 Volt. If any of the gear you use has a different reference (eg.  $0 = .775 \text{ V}/600 \Omega$ ) then use an appropriate correction factor as follows:

0 dBV = 1 V	Voltage	0 dBm = 0.775 V/ 600 $\Omega$ 0 dBu = 0 dBv = 0.775 V/higher than 600 $\Omega$
+6 dB	2 V	+8.2 dB
+1.78 dB	1.228 V	+4 dB
0 dB	1 V	+2.2 dB
-2.2 dB	0.775 V	0 dB
-6 dB	0.5 V	-3.8 dB
-8.2 dB	0.388 V	-6 dB
-10 dB	0.316 V	-7.8 dB
-12 dB	0.250 V	-9.8 dB
-12.2 dB	0.245 V	-10 dB
-20 dB	0.1 V	-17.8 dB

Note:  
The "u" in "0 dBu" stands for "unbalanced".

Peak meters read 3 dB or so higher than RMS or VU meters, so when calibrating your system make sure that any peak meters are reading properly to compensate the difference.

**USING THE OPTIONAL DBX UNIT RX-8**  
**Dynamic range and dbx noise reduction**

"Dynamic range" refers to the contrast between the softest musical passages and the loudest. Music quite often contains dynamic ranges of up to 80 dB, or even as high as 100 dB. Unfortunately, recording tape is limited in the amount of dynamic range it is able to record due to the level of inherent noise on the tape and the level of signals the tape can accept before it reaches a saturation point. The dynamic range of even the best recording tape is limited to about 70 dB; therefore, some of the drama and impact of the music is lost as a result of the limitations of the recording media itself.

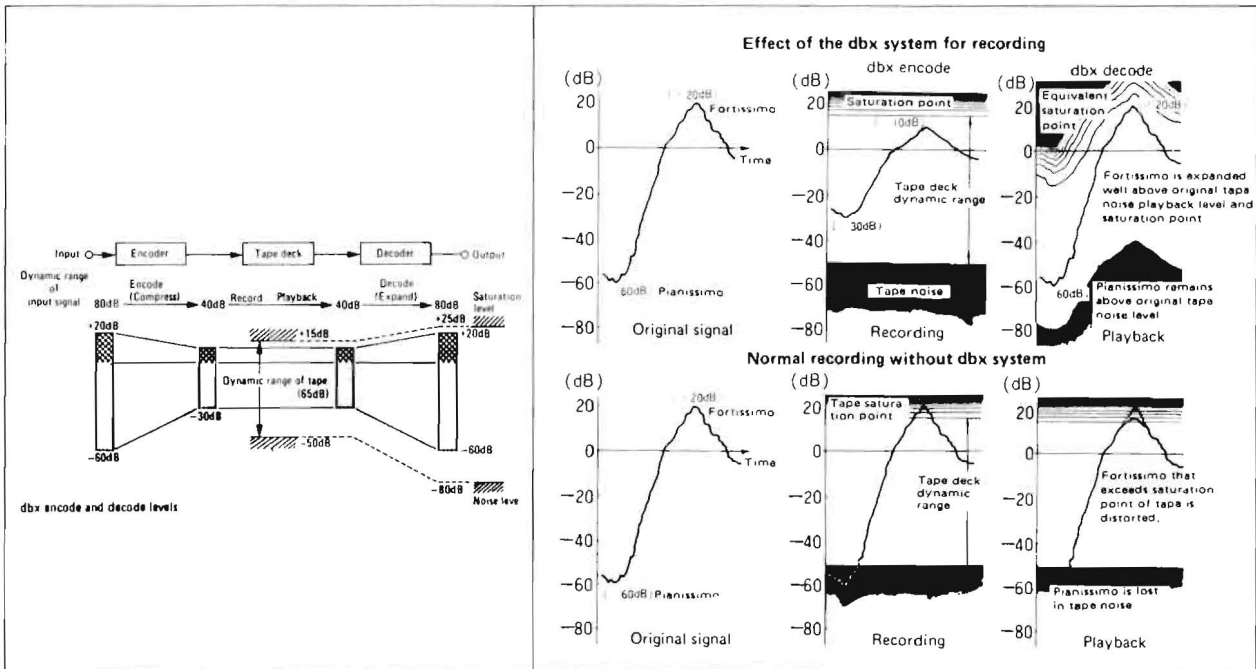
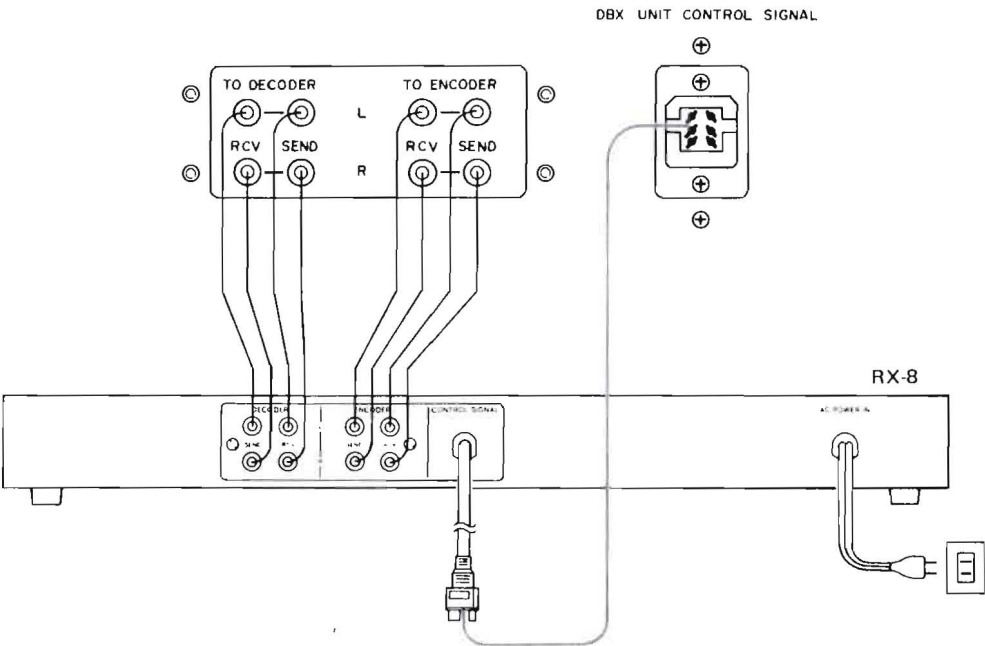
dbx noise reduction systems serve two related purposes — to reduce the relative level of inherent noise on the tape, and thereby restore the dynamic range of the taped signals. This is accomplished by compressing the input signals to half their original dynamic range so that the entire range can fit within the limits of the tape. On playback, the compressed signals are decoded and expanded to their original levels. As the noise level is a ratio of inherent tape noise to input signals, when these input signals are expanded, the noise level is correspondingly reduced because the inherent tape noise is a constant value, but the input signals have been expanded two-fold, so the relative degree of noise has been halved. Not only is the noise inaudible in even the quietest passages, but also the dynamic range has been restored to the original level of up to 100 dB. See the illustration for a visual portrayal of this principle.

Noise reduction systems are used in professional recording studios to capture the full excitement and vitality of the original music, and one of most effective and renowned systems is the dbx noise reduction system and we recommend the use of the RX-8 in the recording chain to obtain the finest quality recordings.

The RX-8 is connected to the rear panel of the 122 as shown in the diagram on the next page with the TO DECODER terminals connected to the RX-8's DECODER terminals and the TO ENCODER terminals connected to RX-8's ENCODER terminals. The CONTROL SIGNAL plug from the RX-8 should be plugged into the 122's CONTROL SIGNAL socket, being careful that the pins are aligned correctly.

**Note:**  
 When the RX-8 is connected to the 122, its **POWER** switch must be on to enable recording and reproducing. The **dbx IN/OUT** switch must be in the **OUT** position to enable **DOLBY** or **DOLBY HX** noise reduction systems to operate properly.

**DO NOT CALIBRATE 122** with the RX-8 connected. Disconnect and install U links for calibration procedure.

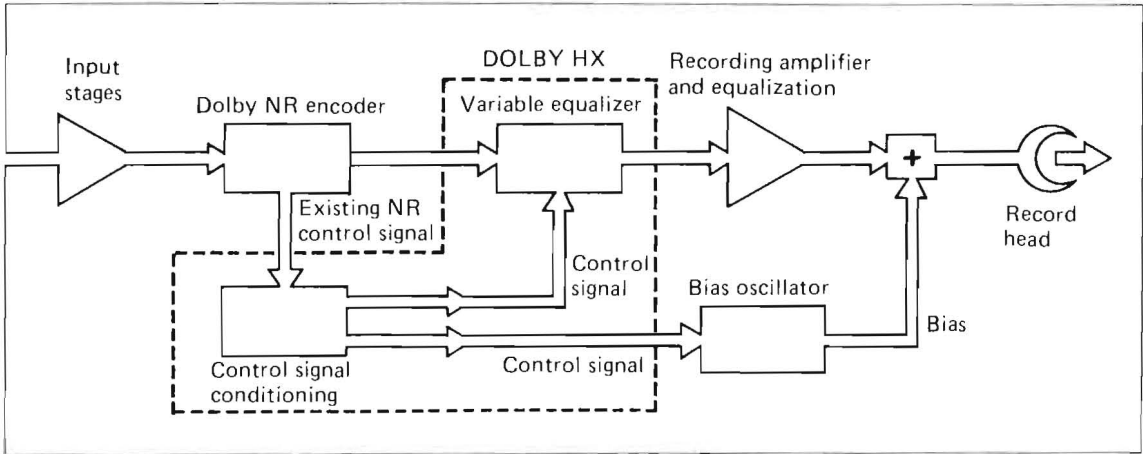




TAPE SATURATION AND DOLBY HX

Dolby HX (Headroom Extender) works in conjunction with the normal Dolby B noise reduction system to increase dynamic range by raising the tape's effective saturation level, thereby extending tape headroom. Dolby HX makes it possible to increase dynamic range by 10 dB or more at frequencies over 10 kHz, while lower frequencies benefit from lower distortion, modulation noise and dropout.

Conventionally, the bias is maintained at a fixed level to match the type of tape being used. In the Dolby HX system, the bias level is constantly adjusted so as to be optimum for the signal being recorded. To maintain a flat frequency response at differing bias levels, recording equalization is automatically adjusted along the bias level. In playback the frequency response is flat, just as if constant amplitude bias had been used so there will be no problems when tapes made on this recorder are played back on a different unit with only the "standard" Dolby.



The additional circuitry constituting Dolby HX takes the control signal from the Dolby B-type noise reduction encoder and through control circuits employs it to vary the power going to the bias oscillator and to adjust the recording equalization appropriately.

Figure 1

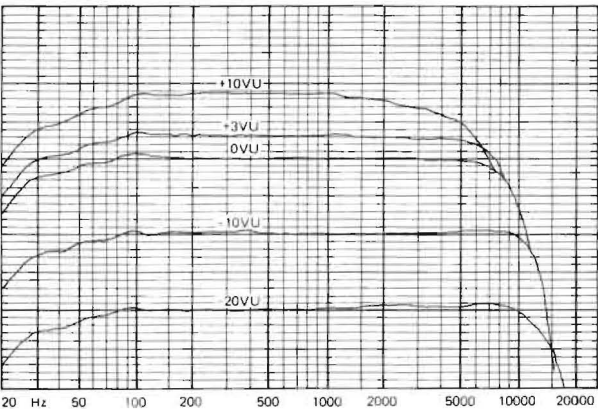


Figure 1. A high-quality cassette deck recording conventionally with iron-oxide tape.

Figure 2

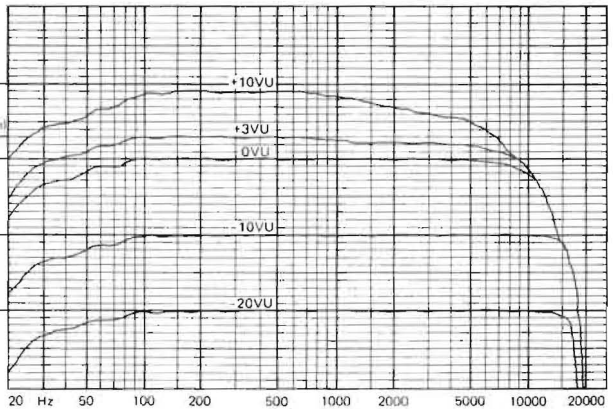


Figure 2. The same tape and the same deck, but this time incorporating Dolby HX.



## Rack Mounting

The angle brackets on both sides of the 122's front panel allow it to be mounted in a standard 19-inch EIA rack. The AH-50 rack mounting handles shown in the photo on the front cover are optional and may be purchased separately.

To rack mount without the handles, attach as shown in Fig. A, using the screws provided.

To rack mount with the handles, first attach the handles, then remove the black plastic covers from the front of the handles (Fig. B); then, inserting a screwdriver through the holes in the handles (Fig. C), attach firmly to the rack.

If rack mounting is not required, the angle brackets may be removed and replaced by attaching the trim-panels provided (Fig. D).

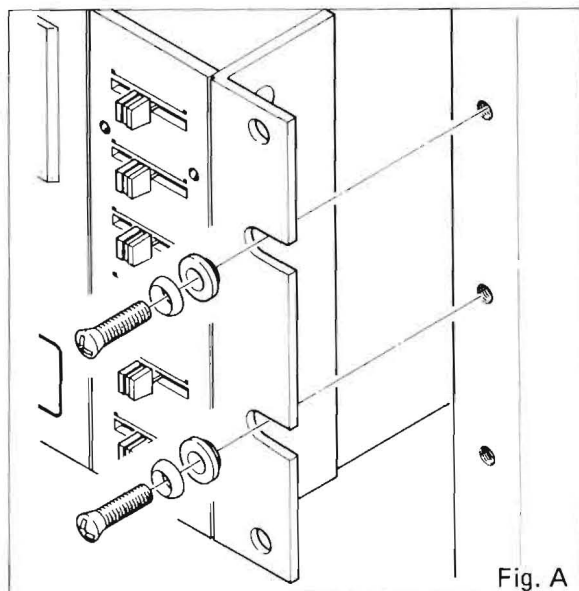


Fig. A

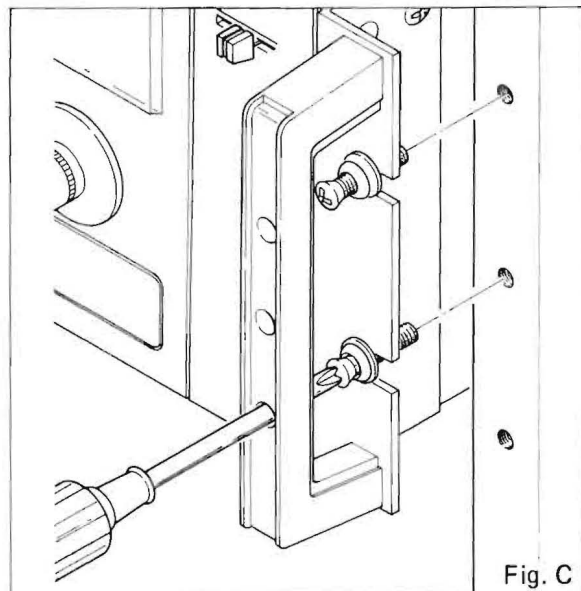


Fig. C



Fig. B

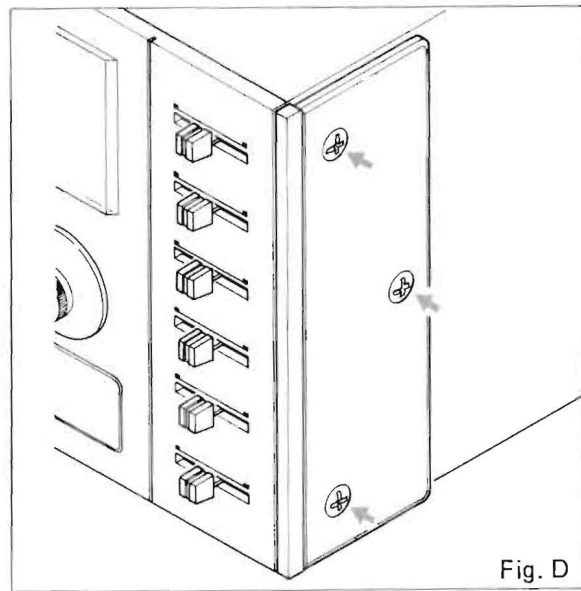


Fig. D

## Care and Maintenance

Performance degradation or electromechanical failure can be prevented by scheduled checks and maintenance. Periodically follow the check items below:

### CLEANING

The first thing you will need for maintenance is definitely the least expensive — cleaning fluids and swabs. The whole outfit, 2 fluids and all the cotton swabs you'll need for months cost less than a couple of high quality cassettes. We can't stress the importance of cleaning too much. Clean up before every session. Clean up after every session. Clean up every time you take a break in the middle of a session (we're serious). Here's why:

1. Any dirt or oxide built-up on the heads will force the tape away from the gaps that record and play back. This will drastically affect the response. Even so small a layer of dirt as one-thousandth of an inch will result in a degraded performance. All the money you have paid for high performance will be wiped out by a bit of oxide. Wipe it off with head cleaner and get back to normal.
2. Tape and tape oxide act very much the same as fine sandpaper. The combination will grind down the tape path in time. If you don't clean off this abrasive material on a regular basis, the wear will be much more rapid and, what's worse, it will become irregular. Even wear on heads can be compensated for by electronic adjustments for a time, but uneven wear can produce notches on heads and guides that will cause the tape to "skew" and skip around from one path to another, making adjustment impossible. This ragged pathway chews up the tape, producing more abrasive material, thus causing more uneven wear and so begins a vicious circle that can't be stopped once it gets a good start. The only solution will then be to replace not only the heads, but all the tape guides as well. Being conscientious about cleaning the tape path on the 122 will more than double the service life of the head assembly.

### Cleaning the heads and tape guides

All heads and metal parts in the tape path must be cleaned after 6 hours of operation or before starting or after ending a recording session. The TEAC HC-1 head cleaner is recommended.

### Cleaning the pinch roller

Clean this at least once each day the deck is used. The TEAC RC-1 rubber cleaner is recommended.

1. Remove the cassette door cover.
2. Activate the PLAY mode.
3. Apply a small amount of RC-1 to the end of a cotton swab.
4. Lightly press the cotton swab onto the pinch roller to the right side of the capstan shaft. This will prevent the swab from becoming entangled. Clean until there is no more visible residue on the pinch roller.
5. Using a clean cotton swab, wipe off all excess RC-1 from the pinch roller. Make certain that there is no foreign matter remaining on either the pinch roller or capstan shaft.

### Cleaning the capstan shaft

The HC-1 head cleaner is recommended.

After cleaning the pinch roller, it is necessary to clean the capstan shaft.

To do so:

1. Activate the PAUSE mode.
2. Apply HC-1 to the end of a cotton swab.
3. Lightly press the cotton swab onto the rotating capstan shaft.

### DEGAUSSING (DEMAGNETIZING)

A little stray magnetism goes a long way. A long way towards making trouble for your tapes that is. It only takes a small amount (1.2 gauss) to cause trouble on the record head and playing 10 cassettes will put about that much charge on the heads and other ferrous parts of the tape path.

A little more than that (.7 gauss) will start to erase high-frequency signals on previously-recorded tapes. Demagnetize the whole tape path. This is a standard guideline even though it may be a bit hard to keep track of. Fast motion isn't as significant to the heads, so we don't give an hourly reference. It's the record/play time that counts.

Degaussing is always done with the recorder turned off. If you try it with the electronics on, the 60-cycle current pulses produced by the degausser will look just like 60 Hz audio signals to the heads, at about 10,000 G and will seriously damage the electronics and/or the meters.

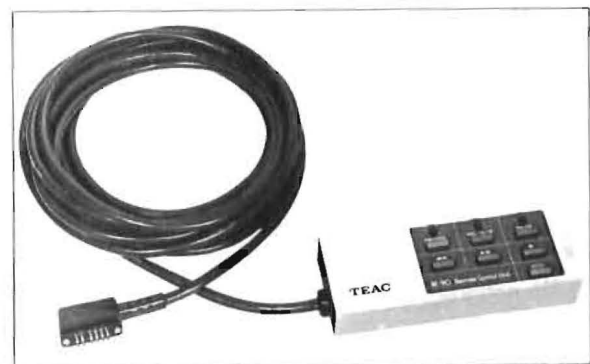
Turn off the machine, turn on the degausser at least 3 feet away from the recorder.

Be certain that your degausser has either a plastic cover or plastic tape covering the tip. Make sure

that no metal ever touches the tape heads as it will scar the head and cause it to be unserviceable. Move slowly in to the tape path. Move the degausser slowly back and forth touching lightly all metal parts in the tape path and slowly move away to at least 3 feet before turning off.

It's a good idea to concentrate when you are degaussing. Don't try to hold a conversation or think of anything else but the job you are doing. If the degausser is turned off or on by accident while it is near the heads, you may put a permanent charge on them that no amount of careful degaussing will remove — head replacement time again, we're sorry to say. Make sure you are wide awake for this procedure.

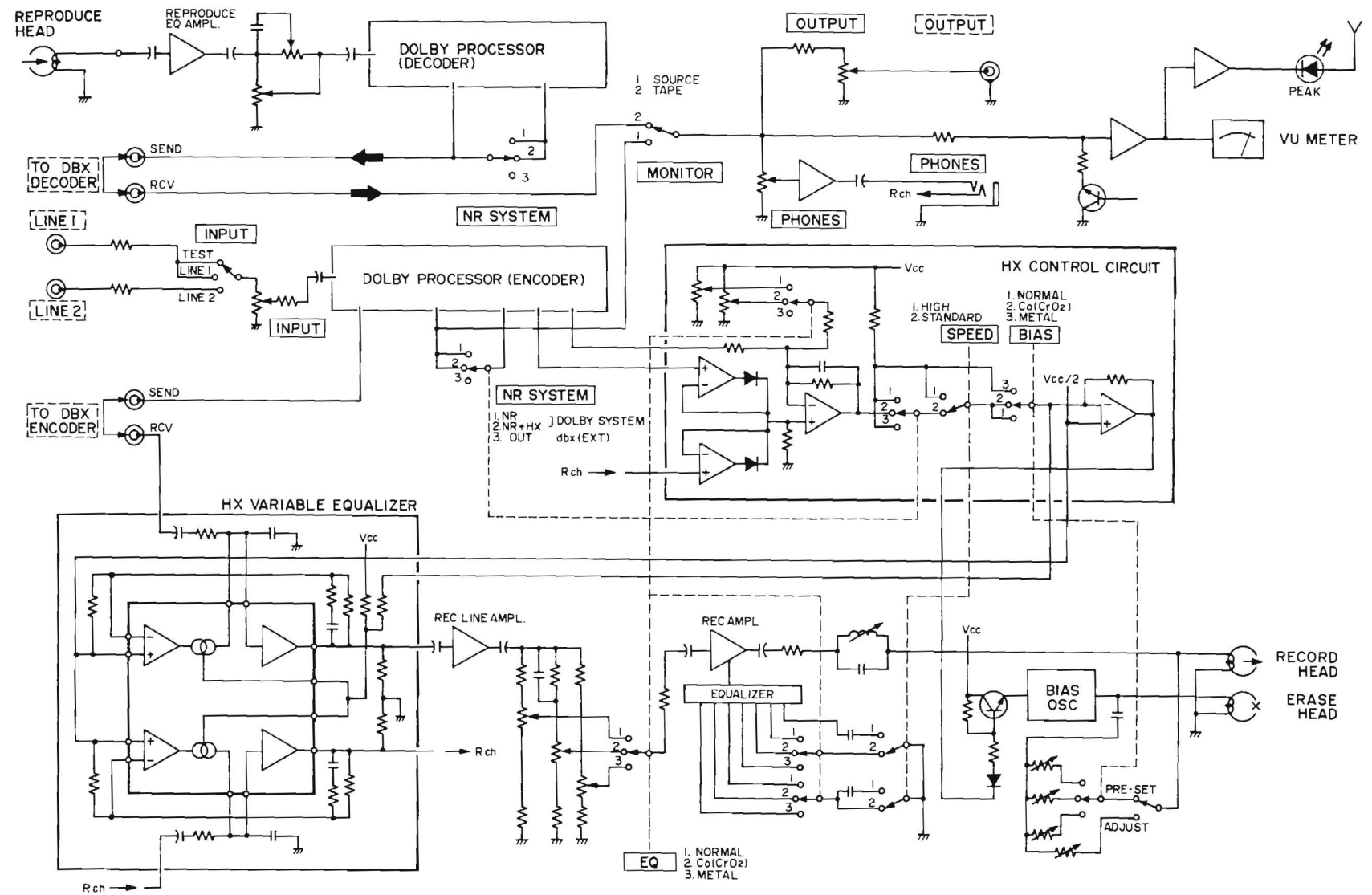
A clean and properly demagnetized tape recorder will maintain its performance without any other attention for quite some time. Even if it does drift as a recorder, it won't ruin previously-recorded material, and getting it back in good shape will not be too difficult.





## Troubleshooting Chart

DIFFICULTY	POSSIBLE CAUSE
<b>Power supply</b> VU meters do not light when POWER switch is ON.	1. Power cord not plugged in firmly or disconnected.
<b>Reproducing</b> No sound	1. MONITOR switch at SOURCE. Set to TAPE. 2. Loose or wrong connection of signal cords. 3. OUTPUT control not correctly adjusted. 4. Pre-Amplifier Receiver controls not correctly adjusted. 5. Shorting links removed from dbx unit connectors. Insert firmly.
<b>Low fidelity</b>	1. SPEED switch in wrong position. 2. Dirty heads. 3. Low-quality recording. 4. Heads magnetized. 5. Poor quality tape.
<b>Hum</b>	1. Too close to a source of hum such as a transformer. Keep the unit away from sources of hum. See if changing the polarity of the power cord plug improves things.
<b>Unstable sound</b>	1. Dirty pinch roller, insufficient tape contact. 2. Dirty heads and tape path. 3. Tape deteriorated.
<b>Recording</b> No program recorded (with MONITOR switch at SOURCE) No program recorded (with MONITOR switch at TAPE) Weak sound or poor fidelity	1. Input signal cords disconnected. 2. Input level too low. 1. Dirty heads. 2. Shorting links removed from dbx unit connectors. 1. Dirty heads. 2. Inferior tape. 3. Input level too low. 4. Heads magnetized. 5. EQ and BIAS switches in wrong positions. 6. Bias/Recording level calibration button in wrong position. Recording onto tape to which bias is specially calibrated should be done with the button in its <u>in</u> position (ADJUST); other tapes must be recorded with the switch in its <u>out</u> position (PRE-SET).



# TASCAM

TEAC Production Products

# 122

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